

REMARKS

This amendment is responsive to the Office action made final mailed May 20, 2004 for the above-captioned application.

- Claims 1-7, 9-15 and 18-25 have been rejected under 35 USC 103(a) as being unpatentable.
- Claim 26 has been objected to as being dependent upon a rejected base claim.
- Claim 26 has been rewritten in independent format.
- No new claims are added.
- Claims 1, 13 and 26 are in independent format
- Claims 1-7, 9-15, and 18-26 are pending.

Objections

The examiner has objected to claim 26 as being dependent upon a rejected base claim, but being allowable if rewritten in independent format including all the limitations of the base claim and any intervening claims. Claim 26 has been rewritten in such manner.

The Cited Art and the Claims Distinguished

The examiner has rejected claims 1-7, 9-16 and 18-25 based on prior art. Claims 1-7, 9-10, 12-15, 18-19 and 22-25 have been rejected under 35 USC 103 (a) as being unpatentable over U.S. Patent No. 5,995,115 (Dickie) in view of Geiger et al. ("Dynamic Programming ..."), Sethian ("Level Set Methods ..."), and U.S. Patent No. 6,546,117 (Sun et al.). The examiner has rejected claims 11 and 20-21 under 35 USC 103(a) as being unpatentable over Dickie in view of Geiger, Sethian and Sun, and further in view of Guo et al. ("New Video Object Segmentation ...").

Dickie discloses a video editing system for tracing and extracting objects in an image. Geiger et al. disclose a dynamic programming method for segmenting an image. Sethian disclose a narrow band method for recovering a shape from an image. Sun et al. disclose a segmentation method using an active contour model with global relaxation for defining optimal image object boundaries. Guo et al. disclose a segmentation method which

generates a binary mask of moving objects from a video clip.

Of the rejected claims, claims 1 and 13 are in independent format. At pages 3-4 of the official action, the examiner has lettered the claim 1 elements as (1.a) through (1.g). The examiner asserts that Sun et al disclose elements (1.e) through (1.g). However, at page 5 of the official action at paragraphs 8 and 9, the examiner recognizes that element (1.f) is not disclosed by Sun et al.

Element (1.f) is as follows:

“when said distance is less than a threshold distance applying a first set of rules for deriving the path from said one control point to the adjacent control point.”

It is noted that the adjacent control point is previously recited in claim 1. Note the following language: “a path is derived from said one control point to an adjacent control point,” and “determining a distance from said one control point to said adjacent control point.”

Thus, claim 1 requires that a path be derived between the two points, (i.e., said one control point and said adjacent control point.) However, the examiner admits that Sun does not disclose a path between these two points when the distance is less than a threshold distance, as is required by claim 1. Instead Sun et al drops the adjacent control point and uses another control point to form a path. It is noted that in Sun when the adjacent control point or substituted control point is less than the threshold distance, a path is not derived between the “said one control point” and the adjacent or substituted control point. In Sun one may eventually get to the condition where the threshold is greater. In such case, the dropped points are no longer control points, and further, a path is not derived between one control point and the dropped control point(s). Accordingly, Sun et al. does not disclose element (1.f).

The examiner appears to recognize this shortcoming of Sun et al., reciting at page 5, paragraph 8:

“[O]ne realizes that this assertion is true only when the distance between the adjacent

control points is less than the first threshold. However, the assertion is not valid for instances where the distance between the adjacent control points is greater than the second threshold.”

It is respectfully submitted that the assertion of element (1.f) is only recited for the condition when the distance between the adjacent control points is less than the first threshold. A different assertion applies, element (1.g), when the distance is greater than the first threshold. Thus, the examiner appears to argue that a disclosure of element (1.g) is satisfactory to disclose element (1.f). Accordingly, applicants respectfully traverse the rejection.

Claim 1 distinguishes over the cited art based at least upon the following claim limitations:

- updating the initial set of control points to an updated set of control points in response to an operator command;
- deriving a current frame object boundary as a closed contour connecting each control point of the updated set of control points, wherein only image data within the restricted area are eligible to form the closed contour, wherein the step of deriving comprises for each one control point of the updated set of control points deriving a path from said each one control point to an adjacent control point, wherein the step of deriving a path comprises:
 - determining a distance from said one control point to said adjacent control point;
 - when said distance is less than a threshold distance applying a first set of rules for deriving the path from said one control point to the adjacent control point; and
 - when said distance is greater than the threshold distance applying a second set of rules, different from the first set of rules, for deriving the path from said one control point to the adjacent control point;
- wherein said derived closed contour serves as a current frame object boundary.

Claims 2-7, 9-12 and 24-25 ultimately depend from claim 1 and distinguish over the cited art based at least upon the same reasons as given for claim 1.

Independent claim 13 includes similar limitations as the limitations in claim 1 discussed above, and distinguishes over the cited art for the same reasons as given above. In particular, claim 13 distinguishes over the cited art based at least upon the following claim limitations:

- means for changing the initial set of control points, the changed set of control points being an updated set of control points, wherein a selected control point among the updated set of control points is either one of a control point added to the initial set of control points or is a control point from the initial set of control points which is relocated;
- a second processor which generates a current-frame object boundary for said object of the current digital image frame using the updated set of control points by deriving a closed contour connecting each control point of the updated set of control points, wherein only image data within the restricted area are eligible to form the closed contour;
- wherein the second processor comprises means for deriving a path from the selected control point to a first adjacent control point and deriving a path from the selected control point to a second adjacent control point, wherein the deriving means comprises:
 - means for determining a distance from said selected control point to said first adjacent control point;
 - when said distance is less than a threshold distance applying a first set of rules for deriving the path from said selected control point to the first adjacent control point; and
 - when said distance is greater than the threshold distance applying a second set of rules, different from the first set of rules, for deriving the path from said selected control point to the first adjacent control point.

Claims 14-15 and 18-23 ultimately depend from claim 13 and distinguish over the cited art for the same reasons as given for claim 13.

Conclusion

In view of the above remarks regarding the cited art, it is respectfully submitted that the claims contain key limitations that are not present in the cited art and not obvious from the


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cited art. These particular limitations, are not disclosed in or suggested by cited references. These limitations are significant advances over the prior art and resulted in a novel method and apparatus for segmenting an object in an image frame.

In view of the above amendments and remarks, it is respectfully submitted that the claims are now in condition for allowance. The Examiner's action to that end is respectfully requested. Reconsideration of the claims and withdrawal of the rejections is respectfully requested.

If, in the opinion of the Examiner, a telephone conference would expedite the prosecution of the application, the Examiner is invited to call the undersigned attorney at the telephone number given below.

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Respectfully submitted,


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